UNIVERSITY OF CALIFORNIA AGRICULTURE AND NATURAL RESOURCES
COOPERATIVE EXTENSION
UC DAVIS DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS

2024

SAMPLE COSTS TO ESTABLISH AN ORCHARD AND PRODUCE

ALMONDS

SAN JOAQUIN VALLEY NORTH

Micro-Sprinkler Irrigation

Roger A. Duncan	UCCE Farm Advisor, Stanislaus County
Phoebe E. Gordon	UCCE Farm Advisor, Madera and Merced Counties
Brent A. Holtz	UCCE Farm Advisor / County Director, San Joaquin County
Cameron Zuber	UCCE Farm Advisor, Merced & Madera Counties
Jhalendra Rijal	UCCE Farm Advisor, San Joaquin & Merced Counties
Jeremy Murdock	Staff Research Associate, Department of Agricultural and Resource Economics, UC Davis
Paul Long	Staff Research Associate, Department of Agricultural and Research Economics, UC Davis
Brittney Goodrich	Assistant Professor, Department of Agricultural and Consumer Economics, University of Illinois Urbana-Champaign

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San Joaquin Valley North - 2024

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INTRODUCTION

Sample costs to establish an almond orchard and produce almonds are presented in this study. This analysis does not represent any single farm and is intended as a guide only. It can be used to help guide production decisions, estimate potential returns, prepare budgets, and evaluate production loans. Sample costs given for labor, materials, equipment, and contract services are based on January 2024 figures. The same sample costs (e.g., labor rates) are used from orchard establishment through the production years, with the understanding that costs will change from year to year. A blank column titled "Your Costs" is provided in Tables 2 and 3 for your convenience.

For an explanation of calculations used in the study, refer to the section titled Assumptions. For more information contact Jeremy Murdock or Paul Long, University of California, Davis Department of Agricultural and Resource Economics, at 530-752-4651 or Pmlong@ucdavis.edu. To discuss this study with a local North San Joaquin Valley UC Cooperative Extension advisor, contact your county cooperative extension office. ucanr.edu/County_Offices/

Sample cost of production studies for many commodities are available and can be downloaded from the Agricultural and Resource Economics Department website, coststudies.ucdavis.edu. Archived studies are also available on the website.

Costs and Returns Study Program/Acknowledgements. A cost and return study is a compilation of specific crop data collected from meetings with professionals working in production agriculture from the region where the study is based. The authors thank the farmer cooperators, and other industry representatives who provided

information, assistance, and expert advice. **The use of trade names and cultural practices in this report does not constitute an endorsement or recommendation by the University of California nor is any criticism implied by the omission of other similar products or cultural practices**. *The University of California, Division of Agriculture and Natural Resources (UC ANR) is an equal opportunity provider.*

ASSUMPTIONS

The assumptions contain background information used in developing Tables 1 to 8 and pertain to sample costs to establish an orchard and produce almonds under micro-sprinkler irrigation in the North San Joaquin Valley. The cultural practices described are based on production practices considered typical for the crop and area but will not apply to every situation.

This study explains the annual costs associated with an orchard operation, under the assumptions that the farm was operated this way in prior years and will continue in subsequent years. The costs, materials, and practices in this study will not apply to all farms. Timing of and types of cultural practices will vary among growers within the region and from season to season due to variables such as weather, soil, and insect and disease pressure.

Farm. The hypothetical farm in this study consists of 105 contiguous acres farmed by the owner. Smaller non- contiguous parcels may have additional costs for travel time and equipment re-calibration. Larger farms will have increased efficiencies and lower per acre costs. Almonds are being established on 100 acres; roads, irrigation systems and farmstead occupy five acres.

Establishment Cultural Practices and Material Inputs

Site Preparation. This 100-acre orchard is established on land previously planted to an orchard, which results in an increased need for pre-plant fumigation due to diseases present in the soil. The land is assumed to be well drained and either a class I or II soil. The existing well and main lines stay in place, while the sub-main lines, lateral lines, and hoses/sprinklers are removed and replaced as part of the new micro-sprinkler irrigation system.

Orchard Removal/Land Preparation. As soon as possible after the last harvest, orchard removal begins with the extraction of the irrigation system. Once the lateral and sprinkler lines are removed, a custom operator uses a dozer to push over the trees. A front-end loader with a clamp grasps the trees and hauls them to the horizontal grinder to mulch the wood. The chips are spread over the entire orchard. The ground is ripped at a 3-foot depth down the tree rows. The field is then cross-ripped at a 45^0 angle) to a 6-foot depth to break up any layers that may restrict water or root movement (e.g., hardpan) and pull up remaining tree roots. The field is disced twice and laser leveled then left unattended until a custom operator is hired to fumigate and tarp each tree row area (11-foot strip) with Telone C35.

Government subsidy programs exist for a wide variety of orchard development practices that improve soil health and promote water conservation. This study will not show any subsidy in particular as program funding and award amounts change on a year-to-year basis and cannot be accurately predicted. Growers should contact their local Air Pollution Control Board, USDA, or NRCS office to see what their specific area has available.

Planting. Prior to planting in January, a custom operator marks the planting sites using GPS. The tree row berms are created with a mechanical planter when planting the trees. After planting, the irrigation lines are laid out and the area between the tree rows are floated/smoothed which also fills in the berms borrow pits. Fall operations that prepare the orchard for planting are done the year prior to planting, but costs are shown in the first year (Table 1).

In January, the trees are planted, topped, trimmed and a carton is placed around the trunk. The carton protects against above ground rodents, herbicide sprays, and sunburn. The trees are given 3-5 gallons of water (by hand) at planting to settle the soil around the roots. Contract labor companies who specialize in orchard planting do the planting operation using a machine. The trees are not staked.

Tree Replacement. One or more trees per acre may die each year and are replaced in late winter. Costs will vary with each orchard and type of tree loss. In the first 5 years of the orchard, 1 percent of the orchard will be replaced due to tree loss. After year 5, no new trees will be planted do to shade out and economic life of the orchard.

Trees. The trees are grown in pots at the nursery. This study assumes that traditional almond varieties are planted that are self-incompatible though no specific varieties are assumed. Traditional almond orchards with self-incompatible varieties include two or more varieties in which bloom periods overlap to insure good pollination. Having two or more varieties in the orchard can affect cultural practices including harvest. The varieties do not mature at the same time. The custom crew will harvest one variety and will come back to harvest the other variety when it is mature. Cost of the trees include scion wood and rootstock patents. Planting densities commonly range from 75 to 180 trees per acre. For this study, 130 trees per acre are planted on a 16' X 22' spacing (tree x row). The life of the orchard at the time of planting is estimated to be 25 years, though many orchards do not reach that age before being removed. Contact the local UCCE advisor or a commercial nursery for varieties and rootstocks that are available.

Train/Prune. Training, which includes suckering and light pruning for shaping is done from September-February of the first non-bearing year. Tree tying to prevent scaffold breakage is done after pruning the first year and again after pruning the second year. Not all orchards need to be tied twice. The tie (using small rope) is made around the tree about one-third of the way from the top of the tree. Tying and roping may continue to year 3 or 4 depending on previous training and variety. In the third and following years, pruning is done in November to January, only to remove limbs for equipment access and safety and hedging to ensure light penetration in between orchard rows to dry nuts. Some growers will periodically hedge or prune their orchards mechanically.

Fertilization. Fertilizer rates shown below are typical nutrient requirements, but do not consider soil and water nitrogen (N). In the first year, Fertilizer is applied through the irrigation system once per month starting in March and continuing through August. The fertilizer, 15-15-15, fertigated through micro sprinkler line near the base of the tree. Although potassium and phosphorous fertilizers are generally not necessary for new trees, 15-15-15 is often used because it is safer than straight N fertilizers.

Table A has the recommended amount of N for the first and following years. Incorporating wood chips from the previous orchard into the soil (whole orchard recycling) will tie-up N initially. As the organic matter decomposes over time, the nitrogen will be released back into the soil. Research has not shown that increased N rates are required for the second- and third-year trees in orchards with incorporated wood chips.

In the second year, N is applied monthly from March to August through the irrigation system. CAN-17 (10% of N budget) is applied during the first two applications and UAN32 thereafter. In year three and the following years, UAN32 is applied monthly from March to May, with one additional after harvest application of N. Potassium sulfate (K_2SO_4) is fertigated in the fall.

In years one and two, foliar zinc is applied with the rust spray in late March and with the shot hole/scab spray in the following years. In October of the second and subsequent years, Solubor (boron) is applied as a foliar spray. Many orchards on the eastside of the northern San Joaquin Valley are boron (B) deficient and additional B may be required. Annual rates of actual N, K, and B applied are shown below.

Table A. Production Information.

	Yields	Fertilizer Lbs./Acre			Irrigation	Pollination
Year	*Lbs./Acre	N	K_2SO_4	B	Acre-Inches	Hives/Acre
1	-	30	-	-	11	-
2	-	55	-	0.4	21	-
3	500	64	80	0.4	32	0.5
4	1000	100	160	0.4	42	1.0
5	1,900	160	300	0.4	42	2.0
6+	2,200	180	350	0.4	42	2.0

Sampling. Tree nutrient status is determined by leaf and hull analysis. Leaf samples are taken to determine the nutrient status of the trees. Hull samples for B analyses are taken from the windrow at harvest. The PCA sends the samples to a commercial lab for analysis. The charges shown are for the lab analyses.

Irrigation. Water is pumped from a well and passes through a filtration system into the micro-sprinklers. Water is applied to the orchard approximately twice a week from mid-March through mid-October. Price per acre-foot of water will vary by grower depending on water source – well or district water, well characteristics, and water district. Irrigation pumping costs are estimated at $200 per acre-foot or $16.66 per acre-inch. Pumping costs can vary considerably based on time of day and the source of electricity; solar panels can reduce the cost of pumping considerably. Table A shows the applied water for each year. Applied water is adjusted to account for banked soil water in the spring and application inefficiency. Application efficiencies of 90 percent are used for all years and reflect the differences in evaporative loss due to canopy development. Effective rainfall is not considered because it is too variable. It is assumed that the season begins with a full soil profile.

Sustainable Groundwater Management Act (SGMA). SGMA requires governments and water agencies of high and medium priority basins to halt overdraft and bring groundwater basins into balanced levels of pumping and recharge, which may significantly restrict the amount of water available to irrigate an orchard during drought years. This study assumes that adequate water will be available for the life of the entire orchard, however careful consideration of the amount and quality of water available for irrigation should be done prior to planting. For detailed information visit the website;
water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management.

Frost Protection. Frost protection may be needed from February through April; however, it may not be needed every year, and the amount of protection will vary. This cost study does not include a cost for frost protection.

Irrigation System Maintenance. The micro-sprinkler irrigation system requires chemical flushing to retard calcium buildup and sprinkler clogging. This operation is performed annually after harvest with N-pHuric acid applied through the system with 0.25 acre-inches of water. This water is in addition to the amounts of water shown in Table A. Not all operations will require this treatment.

Pollination. A commercial beekeeper sets out one-half hive per acre in the third year, one hive in the fourth year and two hives in the fifth year and following production years. Bee colony strength is assumed to be a standard

eight frames per hive and the cost ranges from $200-$220 per hive. For this study, the pollination fee is $210 per hive. Self-fertile varieties have been shown to yield more with bee pollination.

Bees are sensitive to pesticides and timing of applications must coordinate with bee pollinating activity. See the individual pesticide labels, environmental hazards section. For more information visit the websites listed below. https://ipm.ucanr.edu/bee-precaution-pesticide-ratings/

The Almond Board of California recently refreshed the Honey Bee Best Management Practices (BMPs) incorporating new tips and resources that growers and other stakeholders can use to protect honey bees and plan for a productive pollination. almonds.com/pollination

Pest Management. The pesticides and rates mentioned in this cost study, as well as other materials available, are listed in the *UC Integrated Pest Management Guidelines for Almonds* and the *2023 Fungicide Efficacy and Treatment Timing for Almonds* publication located on the UC IPM website at ipm.ucanr.edu. For information on other pesticides available, pest identification, monitoring, and management, check with your PCA and/or visit the UC IPM website. For information and pesticide use permits, contact the local county agricultural commissioner's office.

Pest Control Adviser/Certified Crop Advisor (PCA/CCA). The PCA/CCA monitors the field for agronomic problems including pests and nutrition and writes recommendations for pesticide applications. Growers may hire a private PCA/CCA or receive the service as part of a service agreement with an agricultural chemical and fertilizer company. The PCA/CCA does not charge any fees for monitoring the orchard. The costs are reflected in the price of fertilizer and chemicals as part of the service contract between the grower and the PCA.

Application Methods. All herbicides and fertilizer applications are made by the grower through chemigation (pesticides and/or fertilizers applied through the irrigation water), by ATV mounted ground or spot sprayer, or foliar-broadcast by tractor pulled PTO driven air-blast sprayer. Check individual pesticide labels for compatibility, mixing and usage. All insecticides and fungicides are applied by a custom applicator.

Vegetation Management-Weeds. In the first year, Glufosinate and Prowl are applied to the tree row (strip spray) in February soon after planting. Also, the row middles are disked, floated and then mowed four times during the year. Spot sprays are usually applied as needed. Glufosinate is applied as a spot spray in the tree row during June.

In the second year, the row middles are mowed seven times, once per month from March through September and six times thereafter, March through August. Roundup is applied as a spot spray, once (April) during the growing season to the tree row in the second year, but is usually applied as needed. Prowl and Roundup are applied to the tree row during the dormant season (December).

Beginning in the third year, the dormant strip spray (Matrix and Roundup) is applied to the tree row in the fall, or winter (November). A pre-harvest spray (Roundup and Goal 2XL) is applied to the orchard floor starting in the third year to clean up the row middles prior to harvest.

Insects and Mites. In May, mites are controlled with an Abamectin application. Beginning in the first year, an Air-blast sprayer is used to apply the materials. Beginning in July of the third year, ant bait (Clinch) is sprinkled on the berms for ant control.

Beginning in the third year and in subsequent years, navel orangeworm, *Amyelois transitella* (NOW) is monitored using pheromone traps with lures as well as egg traps (& female traps in many orchards). The traps are placed in

the orchard in March or April to monitor insect flights through hull-split. Insecticide applications of Intrepid 2F for NOW are applied twice, at hull split. These applications are dependent on pest pressure, more or fewer applications may be needed. Other insecticides and timing may be utilized depending upon insect type and pressure. All the traps are monitored by the PCA/CCA.

Winter Sanitation. Winter sanitation in November to January, which destroys overwintering sites and spring food sources for NOW and other insect pests such as *Carpophilus truncatus*, begins in the third year and continues for the life of the orchard. A custom operator shakes and sweeps the mummies. The mummy nuts are either hand-poled (this operation is not very common) or shaken from the trees and swept/blown into the row middle. The nuts are left on the ground and shredding/mowing occurs February or March by the grower.

Some years, mummy nuts stick worse than others ensuing that more labor for hand polling may be required.

Diseases. Rust control is done in the first and second years with an application of Abound (zinc included with spray). In the third and following years, brown rot is treated in February (60% to 80% bloom) with Vanguard; shot hole, scab and rust are treated in March (petal fall or afterwards) with Pristine or Abound (zinc included with spray). Bravo is applied at petal fall for shot hole, scab and anthracnose. Sprays are usually applied with an air-blast sprayer. Materials are applied at reduced volumes during the first three years because of the small tree size.

Vertebrate Pests. Treatments will vary depending upon rodent populations and orchard location. Gophers are managed the first three years with bait. Beginning in the fourth year, gophers are assumed to be under control and spot treatments are used as necessary. Ground squirrels are controlled with traps along the perimeter of the orchard. The grower uses an ATV to check the traps. See the following websites for additional information.
http://www.groundsquirrelbmp.com/

Endangered Species. It is important to know if your farm is located in an area where endangered or threatened species reside. PRESCRIBE is an online database application to allow pesticide applicators to learn if endangered species are in the vicinity of an application site, and the use limitations applicable to the pesticide product(s) they intend to use. The database is implemented by the California Department of Pesticide Regulation. https://www.cdpr.ca.gov/docs/endspec/prescint.htm

Harvest. Mechanical harvesting (shaking) by a custom operator starts in the third year. The nuts are swept/blown into the row middles and picked up mechanically. Typical annual yields for almonds are measured in meat (kernel) pounds per acre and are shown in Table A.

Production Cultural Practices and Material Inputs

Pruning. After the establishment years, only maintenance hand pruning for safety and equipment access is necessary. This is usually completed in November – January but can be done anytime from harvest through the dormant period. Prunings are stacked in the row middles and shredded by a custom operator. Some growers periodically mechanically hedge their orchards, but this cost is not added into this study.

Fertilizer. Nitrogen at 180 pounds per acre per season as UAN-32 is applied monthly March through May with one application after harvest (October) through the irrigation system. Actual nitrogen fertilization rates in a given year should be adjusted based on expected yield. Neutral zinc at five pounds per acre is foliar applied with an insecticide or fungicide spray at pink-bud in March. Potassium sulfate is fertigated in the fall after harvest (October) along the tree row at 350 pounds K_2SO_4 per acre. Boron, at 0.4 pounds per acre, using Solubor (20.5%), is foliar applied in October.

Sampling. Leaf samples are collected by the PCA in July to analyze tree nutrient status. Hull samples are taken from the windrow at harvest. If this sample shows a boron deficiency, a post-harvest boron application should be applied before leaf drop. The PCA collects and sends the samples to a commercial lab for analysis. The charges shown are for the lab analysis.

A water analysis is done annually to determine nitrate availability, maintain regulatory records and monitor toxic elements (chloride, boron, and sodium). A well test to determine pumping rates is also done at this time. The charges are shown in combination.

Irrigation. Irrigation costs include pumping (water) and labor costs. The water is pumped from a well and a booster pressurizing pump pushes the water through the filtration system and out into the micro-sprinkler system. Forty-two acre-inches of water are applied to the orchard based on 90 percent application efficiency from March to October. Applied water values are greater than the actual tree water requirement due to application inefficiency. Water cost or pumping costs are $16.66 per acre-inch, ($200/AcFt) based on current pumping rates. Rates will vary depending upon pump and well specifications and rate program selected. Irrigation labor is listed as a separate line item.

Irrigation System Maintenance. The irrigation system requires chemical flushing annually after harvest with an additional 0.25 acre-inches of water used (in addition to the amounts shown in Table A).

Frost Protection. Frost protection may not be required every year and the amount of protection needed will vary. No frost protection costs are included in this study.

Pollination. In mature orchards two hives (8 frames of bees per hive) per acre are rented for pollination during February through mid-March.

Pest Management. The pesticides and rates mentioned in this cost study are listed in *UC Integrated Pest Management Guidelines, Almonds.* For information on other pesticides available, pest identification, monitoring, and management visit the UC IPM website at ipm.ucanr.edu.

Vegetation Management-Weeds. A dormant strip spray is applied in November or December using pre-emergent and contact herbicides (Roundup, Matrix) to control weeds in the tree rows. Row middles are mowed six times, once per month March through August. Rely is applied as a strip or spot spray in April/May or as needed, but is not included as a cost in this study. A pre-harvest spray (Roundup, Goal 2XL) is applied in August to prepare the orchard floor for harvest.

Insects and Mites. Mites are sprayed with Abamectin in May. Clinch is applied on the berms in July for ant control. Dormant oil applications may be necessary if San Jose scale reaches a treatable level. Additional sprays may be needed for occasional pests like peach twig borer or plant bugs.

Insecticide applications of Intrepid 2F for navel orangeworm (NOW) applied twice (two varieties) in separate applications at hull split in July. These applications are dependent on pest pressure, more or fewer applications may be needed. Other insecticides and timing may be utilized depending upon insect type and pressure.

Pheromone traps with lures as well as egg traps (& female traps in many orchards) are used to monitor NOW. The traps are placed in the orchard in March or April to monitor insect flights through hull-split. All the traps are monitored by the PCA/CCA. This study includes $120 per acre cost for NOW mating disruption, application, and monitoring.

Winter Sanitation. Winter sanitation, November to January, destroys overwintering sites and spring food sources for NOW and Carpophilus beetle. Winter sanitation begins in the third year and continues for the life of the orchard. A custom operator shakes and sweeps the mummy nuts. The mummy nuts are either hand-poled if the mummy load is light or shaken from the trees and swept/blown into the row middle. The nuts are left on the ground and shredded during mowing in February and March by the grower.

Some years, mummy nuts stick worse than others ensuing that more labor for hand polling may be required.

Disease. Brown rot is controlled at 60 to 80 percent bloom in February with Vanguard. Shot hole, scab, and rust treatments with Pristine or Abound are made in March at petal fall or afterwards. Also at petal fall, brown rot, scab, and anthracnose are controlled with an application of Bravo.

Vertebrate Pests. Spot treatment using bait to control gophers is necessary in March and August. Ground squirrels are managed using traps. The traps are placed on two sides of the field and moved regularly. The traps are checked weekly from March through June and again September through October. The costs of the traps, $8.50 per trap, are included in Shop/Field Tools under investments (Table 6).

Harvest, Yields and Revenue

Harvest. A custom operator mechanically harvests the almond crop. Harvest begins in August with the early maturing varieties and continues into October for late maturing varieties. An inertia trunk shaker is the most common shaker in almonds. The shaker head attaches to the tree trunk to shake the nuts from the tree. The nuts fall to the ground and are allowed to dry for about a week. In a separate operation, the nuts are swept into windrows to be picked up. The grower furnishes labor for hand raking to move nuts missed by the sweeper into the windrows. A pickup machine gathers the nuts from the windrow and loads them into a cart or bank out wagon. The nuts are then elevated into trailers for delivery to the huller.

The orchard in this study has more than one variety which mature separately. The custom operator harvests the earlier variety and comes back a few weeks later to harvest the later maturing variety. Some varieties can be harvested together. Custom operators charge on a per acre basis so both harvest operations are included together in this study as one cost. Orchards with only one variety or have varieties that can be mixed may have lower harvest costs.

Yields. Typical annual yields for almonds are measured in pounds of kernels (meats) per acre and are shown in Table A. Yields will vary by location, grower, year, and age of orchard. The assumption in this study is the orchard will average 2,200 pounds per acre for the life of the orchard. This is similar to the statewide average per acre yield.

Revenue. The almond meats are sold for $1.60 per pound based on reported current returns, Table 3.

Ranging Analysis. Table 5 shows a range of yields, 1,600 to 3,400 kernel pounds per acre over a range of prices, $1.00 to $3.00 per pound.

Almond Hulls and By-Products. Almond hulls are high in fiber and can be sold as a feed additive, normally for dairy cows. No additional income to the grower from hull by-products is shown because hulls are sold by the huller.

Assessment. The Almond Board of California assesses all almonds commercially grown in the state to pay for

almond promotions and research. The mandatory assessment is paid by processors and is not reflected in grower costs. ams.usda.gov/rules-regulations/almonds-grown-california-increased-assessment-rate

Labor, Equipment and Operating Interest

Labor. Hourly wages for workers are $22.00 for machine operators and $20.00 per hour non-machine labor. Adding 43.00 percent for the employer's share of federal and state payroll taxes, workers' compensation insurance, for nut crops (Code 0045) and other possible benefits gives the labor rates shown of $31.46 and $28.60 per hour for machine labor and non-machine labor, respectively. Workers' compensation costs will vary among growers. The costs are based upon the average industry final rate as of January 2024. Labor time for operations involving machinery is 20 percent higher than the equipment time to account for the extra labor involved in equipment set up, moving, maintenance, work breaks, and field repair.

Managers Salary. No salary is shown. The farm is owned and operated by the grower, therefore returns above cost are assumed to go to management (grower).

Equipment Operating Costs. Repair costs are based on purchase price, annual hours of use, total hours of life, and repair coefficients formulated by American Society of Agricultural & Biological Engineers (ASABE). Fuel and lubrication costs are also determined by ASABE equations based on maximum power takeoff (PTO) horsepower, and fuel type. Prices for on-farm delivery of diesel and gasoline are $4.80 and $4.40 per gallon, respectively. The costs are based on January 2024, Energy Information Administration (EIA), monthly data. The cost includes a 13.0 percent sales tax on diesel fuel and 2.25 percent sales tax on gasoline. Included in the cost per gallon is federal and state excise tax, $0.36 on diesel fuel and $0.42 on gasoline, which are refundable for on-farm use when filing your income tax. Federal highway tax and local district sales taxes are not included.

Fuel/Lube/Repairs. The fuel, lube and repair cost per acre for each operation in Table 2 is determined by multiplying the total hourly operating cost in Table 7 for each piece of equipment used for the selected operation by the hours per acre. Tractor time is 10 percent higher than implement time for a given operation to account for setup, travel, and down time.

Pickup Truck/Utility Vehicle (ATV). The half-ton pickup is used around the farm to monitor the orchard and for hauling tools and supplies. The ATV is used for herbicide spraying, baiting ants, checking irrigation and vertebrate traps.

Interest on Operating Capital. Interest on operating capital is based on cash operating costs and is calculated monthly until harvest at a nominal rate of 9 percent per year. A nominal interest rate is the typical market cost of borrowed funds. The interest cost of post-harvest operations is discounted back to the last harvest month using a negative interest charge. The rate will vary depending upon various factors, the rate is considered a typical lending rate by a farm lending agency as of January 2024.

Risk. The risks associated with crop production should not be minimized. While this study makes every effort to model a production system based on typical practices, it cannot fully represent financial, agronomic and market risks, which affect profitability and economic viability of almond production. Because of so many potential risk factors, effective risk management must combine specific tactics in a detailed manner, in various combinations for a sustainable operation.

Cash Overhead

Cash overhead consists of various cash expenses paid out during the year that are assigned to the whole farm

and not to a particular operation. These costs include property taxes, interest on operating capital, office expenses, liability and property insurance, sanitation services, equipment repairs, and management.

Property Taxes. Counties charge a base property tax rate of 1 percent on the assessed value of the property. In some counties special assessment districts exist and charge additional taxes on property including equipment, buildings, and improvements. County taxes are calculated as 1 percent of the average value of the property.

Insurance. Insurance for farm investments varies depending on the assets included and the amount of coverage.

Property Insurance. This provides coverage for property loss and is charged at 0.710 percent per $1,000 of the average value of the assets over their useful life.

Liability Insurance. A standard farm liability insurance policy will help cover the expenses for which you become legally obligated to pay for bodily injury claims on your property and damages to another person's property as a result of a covered accident. Common liability expenses covered under your policy include attorney fees and court costs, medical expenses for people injured on your property, injury or damage to another's property. This fee is charged at $833 and covers the entire farm.

Crop Insurance. This is available to almond growers for any unavoidable loss of production, damage or poor quality resulting from adverse weather conditions such as cool wet weather, freeze, frost, hail, heat, rain, wind and damage from birds, drought, earthquakes and fire. Coverage levels are from 50 to 85 percent of the approved average yield as established by verifiable production records from the orchard. A significant number of growers purchase crop insurance in this region. In this study crop insurance at 70 percent coverage is purchased. The USDA Risk Management Agency, 2024 Crop Insurance Policies link: rma.usda.gov/policies/.

Office Expenses. Office and business expenses are estimated at $100 per acre. These expenses include office supplies, telephone/internet, bookkeeping, accounting, shop and office utilities, and miscellaneous administrative charges. Office expenses are estimated and not taken from any collected data.

Environmental/Regulatory Costs. Various environmental fees are collected by the county and state. The fees will vary by county. For example, there are fees assessed by the Air Resources Board (state agency) regulating air pollution, a Water Coalition Fee (local coalition), formerly called an Ag Waiver Fee for water discharges, and hazardous material storage fee (local coalition). The grower must also provide safety training, safety equipment and maintain training records. For this study, a cost of $40 per acre is included.

Miscellaneous Costs. Included expenses for employee safety training, continuing education for pesticide use, materials and applications for unique fields or special conditions.

Sanitation Services. Sanitation services provide one portable toilet and cost the farm $860 annually. The cost includes one double toilet unit with washbasin, delivery and 4 months of weekly service.

Investment Repairs. Annual maintenance is calculated as two percent of the purchase price, except for tree replacement in the orchard.

Non-Cash Overhead

Non-cash overhead, shown on an annual per acre basis is calculated as the capital recovery cost for equipment and other farm investments.

Capital Recovery Costs. Capital recovery cost is the annual depreciation and interest costs for a capital investment. It is the amount of money required each year to recover the difference between the purchase prices and salvage value (unrecovered capital). It is equivalent to the annual payment on a loan for the investment with the down payment equal to the discounted salvage value. This is a more complex method of calculating ownership costs than straight-line depreciation and opportunity costs, but more accurately represents the annual costs of ownership because it takes the time value of money into account (Boehlje and Eidman). The formula for the calculation of the annual capital recovery costs is ((Purchase Price – Salvage Value) x (Capital Recovery Factor)) + (Salvage Value x Interest Rate).

Salvage Value. Salvage value is an estimate of the remaining value of an investment at the end of its useful life. For farm machinery (tractors and implements) the remaining value is a percentage of the new cost of the investment (Boehlje and Eidman). The percent remaining value is calculated from equations developed by the American Society of Agricultural Engineers (ASABE) based on equipment type and years of life. The life in years is estimated by dividing the wear out life, as given by ASABE by the annual hours of use in this operation. For other investments including irrigation systems, buildings, and miscellaneous equipment, the value at the end of its useful life is zero. The salvage value for land is the purchase price because land does not depreciate. The purchase price and salvage value for equipment and investments are shown in Table 6.

Capital Recovery Factor. Capital recovery factor is the amortization factor or annual payment whose present value at compound interest is 1. The amortization factor is a table value that corresponds to the interest rate used and the life of the machine.

Interest Rate. An interest rate of 8.25 percent is used to calculate capital recovery. The rate will vary depending upon loan amount and other lending agency conditions but is the basic suggested rate by a farm- lending agency as of January 2024.

Land. Irrigated cropland values range from $15,000 to $25,000 in the San Joaquin Valley. The orchard site is valued at $25,000 per acre or $2,625,000 for the 105 acres. Established almond orchards in this region range in value from $25,000 to $42,000 per acre (*2023 TRENDS*).

Establishment Cost. Costs to establish the orchard are used to determine the non-cash overhead expenses, capital recovery, and interest on investment for the production years. The establishment cost is the sum of cash costs for land preparation, planting, trees, production expenses, and cash overhead for growing almond trees through the third year less returns from production. The Accumulated Net Cash Cost in the third year shown in Table 1 represents the establishment cost per acre. The cost is $17,292 per acre or $1,729,200 for the 100-acre orchard. Establishment costs are amortized beginning in the fourth year and are continuous for the remaining 22 years of production. The establishment costs added to the bare land value is consistent with the value of an established mature orchard, ($25,000 + $17,292 = $42,292). Establishment costs are based on typical basic operations, but can vary considerably, depending upon terrain, soil type, local regulations and other factors.

Irrigation System. The irrigation system is based on one 175 horsepower electric pump lifting from a water level depth of 120 feet. The pump and 500-foot deep well, already existed on the site. Costs shown are for re-casing of the well and refurbishing the pump. The micro-sprinkler irrigation system costs include the installation of new filtration tanks and chemigation systems, buried sub-main lines and micro-sprinklers. A separate 75 hp booster pump, is used to pump the water through the filtration station out into the sprinkler system. The capacity of this system can irrigate the entire orchard.

The life of the irrigation system is estimated to be 25 years. The irrigation system is considered an improvement

and is shown in the non-cash overhead sections of the narrative and the investment portion of Table 6. An annual pump test is performed in December or January to monitor pumping level and efficiency (gallons/minute) at a cost of $200 per pump for the test. Both pumps are tested and the cost are spread out over the total acreage each pump can service.

Equipment. Farm equipment is purchased new or used, but the study shows the current purchase price for new equipment. The new purchase price is adjusted to 60 percent to indicate a mix of new and used equipment. Annual ownership costs for equipment and other investments are shown in Table 6. Equipment costs are composed of three parts: non-cash overhead, cash overhead and operating costs. Both of the overhead factors have been discussed in previous sections. The operating costs consist of repairs, fuel and lubrication and are discussed under operating costs and shown in Table 7.

Field/Service Tools. This includes an air compressor/welder and the tool boxes for the ranch truck. Also, field tools such as pruning equipment, bait stations, backpack blowers, rakes and shovels. The frost protection alarms are also included in this cost. Shown in Table 6.

Fuel Tanks. Two 1,000-gallon fuel tanks, one for diesel and one for gasoline, using gravity feed are on metal stands. The tanks are setup in a cement containment pad that meets federal, state and county regulations.

Table Values. Due to rounding, the totals may be slightly different from the sum of the components.

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Table 1. COSTS PER ACRE TO ESTABLISH AN ALMOND ORCHARD

San Joaquin Valley-North 2024

	Cost Per Acre				
Year:	1st	2nd	3rd	4th	5th
Operation: Meat Pounds Per Acre: @ $1.60/lb.			500	1000	1,900
Pre-Plant:					
Irrigation System Removal	143				
Orchard Removal: Chip & Spread	1,450				
Rip-3' Depth (Root Removal)	376				
Rip-6' Depth (Root Removal)	443				
Disc & Roll 2x	150				
Laser Level	165				
Soil Fumigate/Tarp: Tree Row (Strip 11')	2,100				
Irrigation System Install	3,500				
TOTAL PRE-PLANT COSTS	8,327				
Plant:					
Survey/Mark Site	40				
Plant: Top, Transplant-Mechanical (130 trees/acre)	1,728				
Wrap/Irrigate (by hand)	103				
Irrigation System Layout	77				
Smooth/Float Between Rows	40				
Replant 1% of Trees		51	51	51	51
TOTAL PLANTING COSTS	1,989	51	51	51	51
Cultural:					
Weeds: Dormant-Strip Spray	40	33	55	55	55
Pollination: Bee Hives			105	210	420
Disease/Fertilize (Zn)	19	32	74	76	76
Diseases (2X)			119	119	119
Mites	84	84	84	84	84
Insects: NOW Disruptor			120	120	120
Insects: NOW (Intrepid) (Yr.4+ 2X)			107	213	213
Insects-Ants			17	17	17
Vertebrate: Gophers	56	60	58	50	50
Vertebrate: Squirrels				51	51
Irrigate	183	350	533	700	700
Irrigation Labor	103	107	137	137	137
Irrigation: Well Test/Water Analysis	5	5	5	5	5
Irrigation: System Flush	17	17	17	17	17
Fertigate: (15-15-15)	124				
Fertigate: (CAN17 only in Year 2)/(UAN32 Year 2+)		43	44	69	110
Fertilize: Foliar (Solubor)		24	38	38	38
Fertigate: (K_2SO_4 50%)			39	78	147
Fertilize: Lab Analysis (Leaf/Hull)	1	1	1	3	3
Prune/Train/Sucker/Tie Ropes/Stack Brush	129	100	233	148	106
Shred Brush			110	110	110
Weeds: Disc Middles	20				
Weeds: Float Middles	17				
Weeds: Mow Middles	56	64	78	78	78
Weeds: Broadcast Spray-Pre-Harvest			28	28	28
Weeds: Spot Spray	10	20			
Insects: NOW Winter Sanitation: Shake (Pole)/Sweep/Mow in-house			159	159	159
Pickup 1/2 Ton Farm Use	92	92	92	92	92
ATV Farm Use	91	91	65	65	65
TOTAL CULTURAL COSTS	1,047	1,122	2,316	2,722	3,000

Table 1. CONTINUED

San Joaquin Valley-North 2024

	Cost Per Acre				
Year:	1st	2nd	3rd	4th	5th
Operation: Meat Pounds Per Acre @ $1.60/Lb.			500	1000	1,900
Harvest:					
Shake, Sweep, Pickup, & Haul Nuts			465	465	465
Hull/Shell Nuts			40	80	152
TOTAL HARVEST COSTS			505	545	617
Interest on Operating Capital @ 9.00%	989	64	81	92	103
TOTAL OPERATING COSTS/ACRE	12,353	1,237	2,953	3,410	3,771
Cash Overhead:					
Office Expense	100	100	100	100	100
Liability Insurance	8	8	8	8	8
Sanitation Fees	9	9	9	9	9
Environmental/Regulatory Fees	40	40	40	40	40
Miscellaneous Costs	20	20	20	20	20
Property Taxes	266	265	266	352	352
Property Insurance	19	19	19	25	25
Investment Repairs	55	55	55	142	142
TOTAL CASH OVERHEAD COSTS	517	516	516	695	695
TOTAL CASH COSTS/ACRE	12,869	1,753	3,470	4,106	4,467
INCOME/ACRE FROM PRODUCTION	-	-	**800**	**1,600**	**3,040**
NET CASH COSTS/ACRE FOR THE YEAR	12,869	1,753	2,670	2,506	1,427
PROFIT/ACRE ABOVE CASH COSTS	-	-	-	-	
ACCUMULATED NET CASH COSTS/ACRE	12,869	14,622	**17,292**	19,798	21,225
NON-CASH OVERHEAD:					
Fuel Tanks 2-1,000 Gallon	12	12	12	12	12
Well/Pump/Filters	209	209	209	209	209
Shop/Field Tools	14	14	14	14	14
Land SJV-North	2,063	2,063	2,063	2,063	2,063
Orchard Establishment				1,729	1,729
Equipment	40	37	45	43	43
TOTAL NON-CASH OVERHEAD COST/ACRE	2,338	2,334	2,342	4,070	4,070
TOTAL COST/ACRE FOR THE YEAR	15,207	4,087	5,812	8,176	8,537
INCOME/ACRE FROM PRODUCTION	-	-	**800**	**1,600**	**3,040**
TOTAL NET COST/ACRE FOR THE YEAR	15,207	4,087	5,012	6,576	5,497
NET PROFIT/ACRE ABOVE TOTAL COSTS	-	-	-	-	-
TOTAL ACCUMULATED NET COST/ACRE	15,207	19,294	24,306	30,882	36,379

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Table 2. COSTS PER ACRE TO PRODUCE ALMONDS

San Joaquin Valley-North 2024

Operation	Equipment Time (Hrs/A)	Labor Cost	Fuel	Lube & Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
				Cash and Labor Costs per Acre				
Cultural:								
Prune: Dormant/Tie Ropes	0.00	57	0	0	20	0	77	
Stack Brush	0.00	29	0	0	0	0	29	
Shred Brush	0.00	0	0	0	0	110	110	
Pollination-Bee Hives	0.00	0	0	0	0	420	420	
Pests: Disease 2x	0.00	0	0	0	39	80	119	
Pests: Disease/Fertilize (Zn)	0.00	0	0	0	36	40	76	
Pests: Vertebrate/Gophers 2x	0.00	29	0	0	17	0	46	
Weeds: Mow Middles 6x	1.10	42	24	12	0	0	78	
Irrigate	0.00	0	0	0	700	0	700	
Fertigate: UAN32 4x	0.00	0	0	0	124	0	124	
Irrigation labor	0.00	137	0	0	0	0	137	
Irrigation-Well/Water-Test/Analysis	0.00	0	0	0	0	5	5	
Pests: Vertebrate/Squirrels 6x	0.00	86	0	0	0	0	86	
NOW Mating Disruption	0.00	0	0	0	120	0	120	
Pests-Mites	0.00	0	0	0	44	40	84	
Fertilize- Leaf Analysis	0.00	0	0	0	0	1	1	
Insects: NOW 2x	0.00	0	0	0	133	80	213	
Pests: Insects Ants	0.00	7	0	0	10	0	17	
Weeds: Pre-Harvest	0.20	8	1	0	19	0	28	
Fertilizer: Hull Analysis	0.00	0	0	0	0	2	2	
Fertilize-Foliar (Boron)	0.25	9	6	3	17	0	34	
Fertigate: K2SO4	0.00	0	0	0	172	0	172	
Weeds: Strip Spray Dormant	0.20	8	1	0	45	0	54	
Winter Sanitation	0.13	5	3	1	0	150	159	
Irrigation: System Flush	0.00	7	0	0	10	0	17	
Pickup Truck Use	1.67	63	20	9	0	0	92	
ATV Use	1.42	53	9	2	0	0	65	
TOTAL CULTURAL COSTS	4.97	539	65	28	1505	928	3,065	
Harvest:								
Shake/Sweep/Pick up/Haul Nuts	0.00	0	0	0	0	465	465	
Hull/Shell Nuts	0.00	0	0	0	0	176	176	
TOTAL HARVEST COSTS	0.00	0	0	0	0	641	641	
Interest on Operating Capital at 9.00%							102	
TOTAL OPERATING COSTS/ACRE	5	539	65	28	1,491	1,569	3,807	

Table 2. CONTINUED

San Joaquin Valley-North 2024

Operation	Operation Time (Hrs/A)	Cash and Labor Costs per Acre: Labor Cost	Fuel	Lube &Repairs	Material Cost	Custom/ Rent	Total Cost	Your Cost
CASH OVERHEAD:								
Environmental/Regulatory Fees							40	
Liability Insurance							8	
Office Expense							100	
Sanitation Fee SJV							9	
Miscellaneous Costs							20	
Crop Insurance (70% Coverage)							44	
Property Taxes							352	
Property Insurance							25	
Investment Repairs							142	
TOTAL CASH OVERHEAD COSTS/ACRE							739	
TOTAL CASH COSTS/ACRE							4,546	
NON-CASH OVERHEAD:		Per Producing Acre		Annual Cost Capital Recovery				
Land SJV		25,000		2,063			2,063	
Fuel Tanks 2-1,000Gal		125		12			12	
Well/Pump/Filters		2,488		209			209	
Shop/Field Tools		150		14			14	
Establishment Costs SJV-north		17,292		1,729			1,729	
Equipment		285		42			42	
TOTAL NON-CASH OVERHEAD COSTS		45,229		4,058			4,069	
TOTAL COSTS/ACRE							8,615	

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TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS

San Joaquin Valley-North 2024

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Almonds #6	2,200	Lb	1.60	3,520	
TOTAL GROSS RETURNS	2,200	Lb		3,520	
OPERATING COSTS					
Herbicide:				**64**	
Roundup PowerMax	3.00	Pint	6.00	18	
Goal 2XL	16.00	FlOz	0.61	10	
Matrix SG	4.00	Oz	8.99	36	
Fungicide:				**66**	
Vanguard WG	5.00	Oz	3.38	17	
Pristine	8.00	FlOz	3.40	27	
Bravo-Weatherstik	48.00	FlOz	0.45	22	
Insecticide:				**308**	
NOW Disruptor/Trap Monitoring	1.00	Acre	120.00	120	
Zeal	2.00	FlOz	22.08	44	
Intrepid 2F	48.00	FlOz	2.78	133	
Clinch	0.50	Lb	19.85	10	
Rodenticide:				**17**	
Vertebrate Pest Bait	4.00	Lb	4.25	17	
Tree Aids:				**20**	
Tree Tying Rope	500.00	Foot	0.04	20	
Custom:				**1,569**	
Shred Prunings	1.00	Acre	110.00	110	
Pollination Fee	2.00	Hive	210.00	420	
Pesticide Spray Application	6.00	Acre	40.00	240	
Irrigation Pump Test	0.02	Each	200.00	4	
Irrigation Water Analysis	0.02	Each	50.00	1	
Leaf Analysis	1.00	Acre	1.00	1	
Hull Analysis	1.00	Acre	2.25	2	
Harvest-Shake/Pickup/Haul Nuts	1.00	Acre	465.00	465	
Hull/Shell Nuts SJV north	2200.00	Lb	0.08	176	
Shake/Sweep Trees- Winter NOW	1.00	Acre	150.00	150	
Irrigation:				**710**	
Water-Pumped	42.25	AcIn	16.66	704	
N-PHuric Acid	0.12	Gal	47.54	6	
Fertilizer:				**321**	
Neutral Zinc 50%	5.00	Lb	1.80	9	
UAN32 (32-0-0)	180.00	Lb N	0.69	124	
Solubor (20,5%)	8.20	Lb	2.03	17	
Potasium Sulfate-K2SO4 50%	350.00	Lb	0.49	172	
Labor				**539**	
Equipment Operator Labor	5.96	hrs	31.46	187	
Pruning Labor	3.00	hrs	28.60	86	
Non-Machine Labor	4.25	hrs	28.60	122	
Irrigation Labor	5.05	hrs	28.60	144	
Machinery				**92**	
Fuel-Gas	2.73	gal	4.40	12	
Fuel-Diesel	10.96	gal	4.80	53	
Lube				10	
Machinery Repair				18	
Interest on Operating Capital @ 9.00%				101	
TOTAL OPERATING COSTS/ACRE				3,807	
TOTAL OPERATING COSTS/LB				2	
NET RETURNS ABOVE OPERATING COSTS				-287	

TABLE: 3 CONTINUED

San Joaquin Valley-North 2024

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
CASH OVERHEAD COSTS					
Environmental/Regulatory Fees				40	
Liability Insurance				8	
Office Expense				100	
Sanitation Fee SJV				9	
Miscellaneous Costs				20	
Crop Insurance (70% Coverage)				44	
Property Taxes				352	
Property Insurance				25	
Investment Repairs				142	
TOTAL CASH OVERHEAD COSTS/ACRE				739	
TOTAL CASH OVERHEAD COSTS/LB				0	
TOTAL CASH COSTS/ACRE				4,546	
TOTAL CASH COSTS/LB				2	
NET RETURNS ABOVE CASH COSTS				-1,026	
NON-CASH OVERHEAD COSTS (Capital Recovery)					
Land SJV				2,063	
Fuel Tanks 2-1,000Gal				12	
Well/Pump/Filters				209	
Shop/Field Tools				14	
Establishment Costs SJV-north				1,729	
Equipment				42	
TOTAL NON-CASH OVERHEAD COSTS/ACRE				4,069	
TOTAL NON-CASH OVERHEAD COSTS/LB				2	
TOTAL COST/ACRE				8,615	
TOTAL COST/LB				4	
NET RETURNS ABOVE TOTAL COST				-5,095	

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TABLE 4. MONTHLY CASH COSTS PER ACRE TO PRODUCE ALMONDS

San Joaquin Valley-North 2024

	JAN 24	FEB 24	MAR 24	APR 24	MAY 24	JUN 24	JUL 24	AUG 24	SEP 24	OCT 24	NOV 24	Total
Cultural:												
Prune-Dormant/Tie Ropes	77											77
Stack Brush		29										29
Shred Brush		110										110
Pollination-Bee Hives		420										420
Pests: Disease 2x		57		62								119
Pest: Disease/Fertilize (Zn)			76									76
Pests: Vertebrate/Gophers 2x			25					21				46
Weeds: Mow Middles 6x			17	14	12	12	12	12				78
Irrigate			17	54	87	121	150	129	92	50		700
Fertigate: UAN32 4x			31	31	31					31		124
Irrigation labor			137									137
Irrigation-Well/Water-Test/Analysis			5									5
Pests: Vertebrate/Squirrels 6x			14	14	14	14			14	14		86
NOW Mating Disruption				120								120
Pests-Mites					84							84
Fertilize-Leaf Analysis							1					1
Insects: NOW 2x							213					213
Pests-Insects Ants							17					17
Weeds: Pre-Harvest								28				28
Fertilizer: Hull Analysis									2			2
Fertilize: Foliar (Boron)										34		34
Fertigate: K2SO4										172		172
Weeds: Strip Spray Dormant											54	54
Winter Sanitation											159	159
Irrigation: System Flush										17		17
Pickup Truck Use	8	8	8	8	8	8	8	8	8	8	8	92
ATV Use	6	6	6	6	6	6	6	6	6	6	6	65
TOTAL CULTURAL COSTS	91	630	336	309	243	161	407	204	122	332	228	3,065
Harvest:												
Shake/Sweep/Pick up/Haul Nuts									465			465
Hull/Shell Nuts									176			176
TOTAL HARVEST COSTS	0	0	0	0	0	0	0	0	641	0	0	641
Interest on Operating Capital @9.00%	1	5	8	10	12	13	16	18	24	-4	-2	102
TOTAL OPERATING COSTS/ACRE	92	635	344	320	255	174	424	222	787	328	226	3,807
CASH OVERHEAD												
Environmental/Regulatory Fees									40			40
Liability Insurance	1	1	1	1	1	1	1	1	1	1	1	8
Office Expense	9	9	9	9	9	9	9	9	9	9	9	100
Sanitation Fee SJV									9			9
Miscellaneous Costs									20			20
Crop Insurance (70% Coverage)									44			44
Property Taxes		176							176			352
Property Insurance		12							12			25
Investment Repairs	13	13	13	13	13	13	13	13	13	13	13	142
2TOTAL CASH OVERHEAD COSTS	23	211	23	23	23	23	23	23	324	23	23	739
TOTAL CASH COSTS/ACRE	115	846	367	342	278	197	446	244	1,111	351	249	4,546

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TABLE 5. RANGING ANALYSIS

San Joaquin Valley-North 2024

COSTS PER ACRE AT VARYING YIELDS TO PRODUCE ALMONDS

	YIELD (lbs./acre)						
	1,600.00	1,800.00	2,000.00	2,200.00	2,600.00	3,000.00	3,400.00
OPERATING COSTS/ACRE:							
Cultural	3,065	3,065	3,065	3,065	3,065	3,065	3,065
Harvest	467	525	583	641	757	872	993
Interest on Operating Capital @ 9.00%	100	101	101	102	102	103	104
TOTAL OPERATING COSTS/ACRE	3,632	3,690	3,749	3,807	3,924	4,040	4,161
TOTAL OPERATING COSTS/LB	2.27	2.05	1.87	1.73	1.51	1.35	1.22
CASH OVERHEAD COSTS/ACRE	739	739	739	739	739	739	739
TOTAL CASH COSTS/ACRE	4,372	4,430	4,488	4,546	4,663	4,780	4,901
TOTAL CASH COSTS/LB	2.73	2.46	2.24	2.07	1.79	1.59	1.44
NON-CASH OVERHEAD COSTS/ACRE	4,069	4,069	4,069	4,069	4,069	4,069	4,069
TOTAL COSTS/ACRE	8,440	8,499	8,557	8,615	8,732	8,848	8,970
TOTAL COSTS/LB	5.00	5.00	4.00	4.00	3.00	3.00	3.00

Net Return per Acre above Operating Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1600.00	1800.00	2000.00	2200.00	2600.00	3000.00	3400.00
1.00	-2,032	-1,890	-1,749	-1,607	-1,324	-1,040	-761
1.20	-1,712	-1,530	-1,349	-1,167	-804	-440	-81
1.40	-1,392	-1,170	-949	-727	-284	160	599
1.60	-1,072	-810	-549	-287	236	760	1,279
2.00	-432	-90	251	593	1,276	1,960	2,639
2.50	368	810	1,251	1,693	2,576	3,460	4,339
3.00	1,168	1,710	2,251	2,793	3,876	4,960	6,039

Net Return per Acre above Cash Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1600.00	1800.00	2000.00	2200.00	2600.00	3000.00	3400.00
1.00	-2,772	-2,630	-2,488	-2,346	-2,063	-1,780	-1,501
1.20	-2,452	-2,270	-2,088	-1,906	-1,543	-1,180	-821
1.40	-2,132	-1,910	-1,688	-1,466	-1,023	-580	-141
1.60	-1,812	-1,550	-1,288	-1,026	-503	20	539
2.00	-1,172	-830	-488	-146	537	1,220	1,899
2.50	-372	70	512	954	1,837	2,720	3,599
3.00	428	970	1,512	2,054	3,137	4,220	5,299

Net Return per Acre above Total Costs for Almonds

PRICE ($/lb)	YIELD (lbs./acre)						
Almonds	1600.00	1800.00	2000.00	2200.00	2600.00	3000.00	3400.00
1.00	-6,840	-6,699	-6,557	-6,415	-6,132	-5,848	-5,570
1.20	-6,520	-6,339	-6,157	-5,975	-5,612	-5,248	-4,890
1.40	-6,200	-5,979	-5,757	-5,535	-5,092	-4,648	-4,210
1.60	-5,880	-5,619	-5,357	-5,095	-4,572	-4,048	-3,530
2.00	-5,240	-4,899	-4,557	-4,215	-3,532	-2,848	-2,170
2.50	-4,440	-3,999	-3,557	-3,115	-2,232	-1,348	-470
3.00	-3,640	-3,099	-2,557	-2,015	-932	152	1,230

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 6. WHOLE FARM ANNUAL EQUIPMENT, INVESTMENT AND BUSINESS OVERHEAD COSTS

San Joaquin Valley-North 2024

ANNUAL EQUIPMENT COSTS

Yr.	Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Total
24	Air-Blast PTO 500Gal	31,000	8	6,999	4,794	13	190	4,997
24	Flail Mower 16'	13,900	10	2,458	1,927	6	82	2,015
24	ATV-4WD	9,350	8	3,263	1,338	4	63	1,406
24	Pickup Truck 1/2 Ton	48,000	5	21,512	8,453	25	348	8,825
24	85HP4WD Low-Profile Tractor	79,000	15	15,380	8,815	34	472	9,321
24	ATV Sprayer System 100 Gal	3,850	10	681	534	2	23	558
	TOTAL	185,100	-	50,294	25,861	84	1,177	27,122
	60% of New Cost*	111,060	-	30,176	15,517	50	706	16,273

*Used to reflect a mix of new and used equipment

ANNUAL INVESTMENT COSTS

Description	Price	Yrs. Life	Salvage Value	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Cash Overhead Repairs	Total
INVESTMENT								
Land SJV	2,625,000	30	2,625,000	216,563	1,864	26,250	0	244,676
Fuel Tanks 2-1,000Gal	12,500	25	875	1,185	5	67	250	1,506
Well/Pump/Filters	248,775	50	0	20,921	88	1,244	4,976	27,230
Shop/Field Tools	15,000	25	1,500	1,416	6	83	300	1,804
Establishment Costs SJV-north	1,729,200	22	0	172,882	614	8,591	8,646	190,788
TOTAL INVESTMENT	4,630,475	-	2,627,375	412,966	2,577	36,289	14,112	466,004

ANNUAL BUSINESS OVERHEAD COSTS

Description	Farm	Unit	Unit	Cost
Environmental/Regulatory Fees	100	Acre	40.00	4,000
Liability Insurance	105	Acre	7.93	833
Office Expense	100	Acre	100.00	10,000
Sanitation Fee SJV	100	Acre	8.60	860
Miscellaneous Costs	100	Acre	20.00	2,000
Crop Insurance (70% Coverage)	100	Acre	43.95	4,395

UC COOPERATIVE EXTENSION-AGRICULTURAL AND RESOURCE ECONOMICS, UC DAVIS

TABLE 7. HOURLY EQUIPMENT COSTS

San Joaquin Valley-North 2024

Yr.	Description	Almond-Prod Hours Used	Total Hours Used	Capital Recovery	Cash Overhead Insurance	Cash Overhead Taxes	Operating Lube & Repairs	Operating Fuel	Total Oper.	Total Costs/Hr.
24	Air-Blast PTO 500Gal	25	250	11.50	0.03	0.46	5.23	0.00	5.23	17.22
24	Flail Mower 16'	123	200	5.78	0.02	0.25	5.60	0.00	5.60	11.64
24	ATV-4WD	182	625	1.28	0.00	0.06	1.19	6.60	7.79	9.14
24	Pickup Truck 1/2 Ton	167	400	12.68	0.04	0.52	5.33	12.00	17.33	30.57
24	85HP4WD Low-Profile Tractor	163	1066	4.96	0.02	0.27	4.84	20.04	24.88	30.12
24	ATV Sprayer System 100 Gal	40	150	2.14	0.01	0.09	1.01	0.00	1.01	3.25

TABLE 8. OPERATIONS WITH EQUIPMENT AND MATERIALS

San Joaquin Valley-North 2024

Operation	Operation Month	Tractor	Implement	Labor Type/ Material	Rate/ acre	Unit
Prune-Dormant/Tie Ropes	Jan			Pruning Labor	2.00	hours
				Tree Tying Rope	500.00	Foot
Stack Brush	Feb			Pruning Labor	1.00	hour
Shred Brush	Feb			Shred Prunings	1.00	Acre
Pollination-Bee Hive	Feb			Pollination Fee	2.00	Hive
Pests-Disease 2x	Feb			Vanguard WG	5.00	Oz
				Pesticide Spray Application	1.00	Acre
	Apr			Bravo-Weatherstik	48.00	FlOz
				Pesticide Spray Application	1.00	Acre
Pest-Disease/Fertilizer	Mar			Pristine	8.00	FlOz
				Neutral Zinc 50%	5.00	Lb
				Pesticide Spray Application	1.00	Acre
Pests-Vertebrate/Gopher	Mar			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	2.50	Lb
	Aug			Non-Machine Labor	0.50	hour
				Vertebrate Pest Bait	1.50	Lb
Weeds-Mow Middles 6x	Mar	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.28	hour
	Apr	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.24	hour
	May	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.20	hour
	June	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.20	hour
	July	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.20	hour
	Aug	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.20	hour
Irrigate	Mar			Water-Pumped	1.00	AcIn
	Apr			Water-Pumped	3.25	AcIn
	May			Water-Pumped	5.25	AcIn
	June			Water-Pumped	7.25	AcIn
	July			Water-Pumped	9.00	AcIn
	Aug			Water-Pumped	7.75	AcIn
	Sept			Water-Pumped	5.50	AcIn
	Oct			Water-Pumped	3.00	AcIn
Fertigate: UAN32 4x	Mar			UAN32 (32-0-0)	45.00	Lb N
	Apr			UAN32 (32-0-0)	45.00	Lb N
	May			UAN32 (32-0-0)	45.00	Lb N
	Oct			UAN32 (32-0-0)	45.00	Lb N
Irrigation labor	Mar			Irrigation Labor	4.80	hours
Irrigation-Well/Water	Mar			Irrigation Pump Test	0.02	Each
				Irrigation Water Analysis	0.02	Each
Pests-Vertebrate	Mar			Non-Machine Labor	0.50	hour
	Apr			Non-Machine Labor	0.50	hour
	May			Non-Machine Labor	0.50	hour
	June			Non-Machine Labor	0.50	hour
	Sept			Non-Machine Labor	0.50	hour
	Oct			Non-Machine Labor	0.50	hour
NOW Mating Disruption	Apr			NOW Disruptor/Trap Monitoring	1.00	Acre
Pests-Mites	May			Equipment Operator Labor	0.36	hour
				Zeal	2.00	FlOz
				Pesticide Spray Application	1.00	Acre
Fertilize-Leaf Analysis	July			Leaf Analysis	1.00	Acre
Insects: NOW 2x	July			Intrepid 2F	24.00	FlOz
				Pesticide Spray Application	1.00	Acre
	July			Intrepid 2F	24.00	FlOz
				Pesticide Spray Application	1.00	Acre
Pests-Insects Ants	July			Non-Machine Labor	0.25	hour
				Clinch	0.50	Lb
Pests-Weeds Pre-Harvest	Aug		ATV-4WD	Equipment Operator Labor	0.24	hour
				Roundup PowerMax	1.50	Pint
			ATV Sprayer System 100 Gal	Goal 2XL	16.00	FlOz
Fertilizer: Hull Analysis	Sept			Hull Analysis	1.00	Acre
Fertilize-Foliar (Boron)	Oct	85HP4WD Low-Profile	Air Blast Sprayer PTO 500Gal	Equipment Operator Labor	0.30	hour
				Solubor (20,5%)	8.20	Lb
Fertigate: K2SO4	Oct			Equipment Operator Labor	0.22	hour
				Potasium Sulfate-K2SO4 50%	350.00	Lb
Pests-Weeds Strip Spray	Nov		ATV-4WD	Equipment Operator Labor	0.24	hour
				Roundup PowerMax	1.50	Pint
			ATV Sprayer System 100 Gal	Matrix SG	4.00	Oz
Winter Sanitation	Nov	85HP4WD Low-Profile	Flail Mower 16’	Equipment Operator Labor	0.15	hour
				Shake/Sweep Trees- Winter Now	1.00	Acre
Irrigation: System Flush	Oct			Irrigation Labor	0.25	hour
				Water-Pumped	0.25	AcIn
				N-PHuric Acid	0.12	Gal

Operation	Month	Tractor	Implement	Labor Type/Material	Rate/Acre	Units
Pickup Truck Use	Oct		Pickup Truck 1/2 Ton	Equipment Operator Labor	2.00	hours
ATV Use	Oct		ATV-4WD	Equipment Operator Labor	1.70	hours
Shake/Sweep/Pick up/	Sept			Harvest-Shake/Pickup/Haul Nuts	1.00	Acre
Hull/Shell Nuts	Sept			Hull/Shell Nuts SJV north	2,200.00	Lb